The D-Z Stump Protector

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After an amputation of the proximal, middle, or distal phalanx, a hypersensitive or painful stump can make it difficult for the patient to achieve function. Some patients may stop, or substantially decrease, the use of their hands or fingers. Those who try to use the impaired hands or fingers may develop maladaptive or avoidance grasp patterns.

Even with the implementation of a desensitization program 10 to 15 days after the amputation, hypersensitivity over the tip of the stump may persist. (The program I use is similar to those described by Barber, 1984, and by Yerxa, Barber, Diaz, Black, and Azen, 1983.) To assist in the treatment of this problem, I designed the D-Z Stump Protector (see Figures 1 and 2). D-Z is an abbreviation for desensitizer. This orthosis not only protects the stump but also provides gentle, constant pressure in a form-fitting splint. Regular finger guards, by contrast, deprive the stump of adequate stimulation, which is necessary for desensitization. Furthermore, depending on the length of the phalange, the D-Z protector allows full range of motion of the proximal joints.

Materials and Construction

Materials needed are 1 oz to 2 oz of silicone elastomer (Otoform-K), 1/2 in. of hardener (catalyst), perforated, low-temperature thermoplastic 1/16 in. thick (Orfit or Aquaplast), self-adherent elastic bandage measuring 1 in. X 14 to 16 in. (Coban wrap).

To obtain a pattern like the one in Figure 3 measure the length of the stump from the tip to the next proximal joint. This distance is doubled, yielding a volar and dorsal length. Add about 1/4 in. for covering the tip and cut a vee from each side of the center. Then measure the circumference of the tip of the stump and phalange. It is important that the volar portion overlap the dorsal portion by about 1/4 in. The pattern is cut from the thermoplastic, which is then placed in a heating pan of 135 °F to 150 °F.

The white elastomer is molded over the stump and phalanges, so that a 3/4 in. uniform thickness is achieved. The elastomer is removed from the digit and the red hardener is added and worked into the white elastomer until it becomes pink. During the remaining 3- to 5-minute working time mold the elastomer, now pink, over the stump and phalanges.

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maintaining a ½ in. uniform thickness and leaving the proximal joint free. Immediately remove the thermoplastic from the heating pan, dry it with a towel, and mold it over the pink elastomer, overlapping volar over dorsal, making sure the tip is completely covered.

With the elastic bandage, immediately wrap the orthosis distally to proximally, covering the tip. This not only ensures an exact fit but also forces the elastomer into the perforations of the thermoplastic before setting, holding the orthosis together. Let the materials set for 5 minutes before removing the elastic bandage. When cool, the orthosis can be removed. Any rough edges can be smoothed with a heating pan or a heat gun. Additional heat may be needed to seal the overlapped portions.

Application
The orthosis is fabricated 20 to 25 days after amputation (see Figure 4) or sooner if there are no open wounds. After a 15-minute desensitization program, the orthosis is placed on the involved digit. The patient is instructed to tap lightly on a hard surface for 5 to 10 minutes. Benefits of tapping or percussion for desensitization have been described by Russell (1949) and by Wilson and Carter (1984), who said, "Desensitization of the tip is achieved through progressive activities that begin with rubbing and tapping and proceed to resistive pinching and grasping activities" (p. 182).

Patients are instructed to wear the orthosis during activities of daily living but not all day or while sleeping. Continuous wear can cause a rash or skin maceration; therefore, the orthosis should be removed frequently so that the digit can be cleaned. Patients are progressively weaned from the orthosis and return to work depending on their occupation.

The D-Z stump protector is an adjunct to the desensitization program, and its use is temporary. The patient should attempt to use the hand and digit both with and without the protector. My experience has been that patients are more willing to use the involved hand and digit while wearing the orthosis. Patients also report that the orthosis allows them to do more activities with less discomfort. In our practice, six patients who avoided using their hands and digits...
and who had not returned to work despite having undergone a desensitization program used the orthosis for 3 to 5 weeks and were back at work in some capacity within 8 to 12 weeks after the injury. At 1 year follow-up, none of the patients reported recurrent hypersensitivity

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